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2001-2010: Decade to Roll Back Malaria in Developing Countries, Particularly in Africa

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Note by the Secretary-General

The Secretary-General hereby transmits the report entitled "2001-2010: Decade to Roll Back Malaria in Developing Countries, Particularly in Africa" prepared by the World Health Organization in accordance with General Assembly resolution 60/221.

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Summary

The present report highlights the activities undertaken and progress made since the last report (A/60/208) in meeting the 2010 malaria goals, in the context of General Assembly resolution 60/225 and the Abuja Declaration on Roll Back Malaria in Africa (2000). The report provides an evaluation of the Roll Back Malaria Programme for the period 2000–2005 and a vision for malaria control from 2006 onwards. It reviews, inter alia, developments in case management and prevention, and prospects for the elimination of malaria, including issues related to research and development and resource mobilization. In addition, the report addresses the problems associated with malaria in pregnant women and the special challenges of malaria epidemics in complex emergencies. It also provides some conclusions and recommendations for the consideration of the General Assembly.

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I. Introduction and background

1. Malaria is largely a killer of children and poor people. It continues to threaten at least 3 billion people in 107 countries and territories. While most of the burden is on Africa, malaria is a global problem, continuing to hinder social and economic development in Asia, Latin America, the Middle East, Europe and the Pacific. Each year, more than 500 million people suffer from acute malaria, resulting in more than 1 million deaths — at least 86 per cent of which occur in sub-Saharan Africa. An estimated 3,000 children and infants die from malaria every day. Each year, approximately 50 million women living in malaria-endemic countries throughout the world become pregnant, of whom over half live in tropical areas of Africa with intense transmission of Plasmodium falciparum. Although malaria in pregnancy is predominantly asymptomatic in those regions, it is a major cause of severe maternal anaemia and is also responsible for approximately one third of preventable low birth weight babies. Consequently, it contributes to the deaths of an estimated 10,000 pregnant women and up to 200,000 infants each year in Africa alone. In areas of low or seasonal transmission, pregnant women are at increased risk of dying from the complications of severe malaria and of experiencing spontaneous abortion, premature delivery or stillbirth. Outside Africa, all age groups are at risk of malaria, but it is mostly concentrated in poor, "marginalized" populations, such as refugees and internally displaced persons. Malaria can also strike the more than 125 million non-immune travellers who visit malaria-endemic countries annually. Every year there are between 10,000 and 30,000 cases among travellers, which sometimes result in fatality.

2. Malaria has significant effects on long-term economic growth and development. It has been shown that countries with a high burden of Plasmodium falciparum malaria in 1965 had annual economic growth rates that were 1.3 per cent lower than other countries during the period 1965-1990, even after controlling for other determinants of growth. Evidence shows that malaria keeps poor people poor, costing Africa US$ 12 billion per year in lost gross domestic product and consuming up to 25 per cent of household incomes and 40 per cent of government health spending. Malaria disproportionately affects poor people, with almost 60 per cent of malaria cases occurring in the poorest 20 per cent of the world's population. There are numerous channels through which the disease can contribute to lower economic growth and poverty, including private and non-private medical care costs, reduced productivity of malaria sufferers and caretakers and reduced size of the labour force relative to the entire population, by influencing fertility decisions and therefore the demographic structure of societies, by discouraging foreign direct investment, trade and tourism, and by inhibiting the movement of labour. Malaria has lifelong effects on cognitive development and education levels, owing to malaria-induced anaemia and impaired learning and attendance in schools. In view of the enormous burden malaria places on countries' economies, it is imperative that national poverty alleviation programmes explicitly target actions and resources towards malaria control.

II. Evaluation of Roll Back Malaria 2000-2005

3. The Roll Back Malaria Partnership, launched in 1998 by the World Health Organization (WHO), the World Bank, the United Nations Children's Fund (UNICEF) and the United Nations Development Programme (UNDP), includes malaria-endemic countries, their bilateral and multilateral development partners, the private sector, non-governmental and community-based organizations, foundations and research and academic institutions. All of those constituencies are represented on the Roll Back Malaria Partnership Board.

4. The Roll Back Malaria Partnership secretariat, hosted by WHO, is responsible for optimizing support for country-level efforts and ensuring that contributions from individual partners are coordinated and focused on the needs of countries. The main goal of the Partnership is to halve malaria mortality by 2010 and reduce it by 75 per cent by 2015. The Roll Back Malaria interim goals were to support the following Abuja targets: (a) at least 60 per cent of people suffering from malaria should be able to access and use correct, affordable and appropriate treatment within 24 hours of the onset of symptoms; (b) at least 60 per cent of people at risk of malaria, particularly pregnant women and children under five, should benefit from suitable personal and community protective measures, such as insecticide-treated nets; and (c) at least 60 per cent of all pregnant women who are at risk of malaria, especially those in their first pregnancies, should receive intermittent preventive treatment.

5. Since 1998, there has been a resurgence of international attention and support for malaria control, such that there exists a window of opportunity to achieve long overdue reductions in mortality and morbidity from the disease. Various new tools, including long-lasting insecticide-treated nets, rapid diagnostic tests, and highly effective artemisinin-combination therapies (ACTs), have become available to prevent, diagnose and treat malaria. Moreover, increases in bilateral funding were accompanied by the inception of the Global Fund to fight AIDS, Tuberculosis and Malaria and announcements by the World Bank that it would provide large increases in funding for malaria. However, those opportunities have not been utilized fully, resulting in a mixed record on malaria control progress in countries over the last five years.

6. With respect to the Abuja targets for African countries, from 1999 to 2004, across national surveys from 35 African countries, the median proportion of children that were treated with an antimalarial drug was approximately 50 per cent. However, most of those treatments may have been ineffective, since 95 per cent were with chloroquine, against which Plasmodium falciparum is resistant, a significant proportion was not administered within 24 hours of the onset of fever and the dosage was not evaluated. Based on data collected in African countries since 2001, in six countries, insecticide-treated net coverage of children under 5 years of age reached between 34 per cent and 54 per cent. In 27 countries, such coverage of children under 5 years of age is below 30 per cent. In eight countries, between 36 and 45 per cent of pregnant women sleep under insecticide-treated nets and in 21 countries, insecticide-treated net coverage of pregnant women remains below 30 per cent. However, coverage with any nets (including untreated nets) is much higher. Coverage of households with indoor residual spraying in the African region increased from 2.7 million to 4 million from 1999 to 2003, and the intervention is now being implemented in 17 southern and East African countries. From those surveys, it seems that no countries have achieved the Abuja targets.

7. At the same time, overall progress towards the Abuja targets is not known with certainty, since monitoring was based on national surveys not matched to Roll Back Malaria indicators and its interim goals. Recently, notable progress in increasing effective coverage of specific interventions seems to have been achieved in some countries, i.e., insecticide-treated nets in, inter alia, Eritrea, the Niger, Togo, Zambia and Zanzibar, United Republic of Tanzania; indoor residual spraying in, inter alia, Botswana, South Africa and Swaziland; and treatment with ACTs in, inter alia, Burundi, Ethiopia, South Africa, Zambia, and Zanzibar, United Republic of Tanzania. Progress in many of those countries is due in part to increased funds through the Global Fund to fight AIDS, Tuberculosis and Malaria and technical assistance from WHO.

8. The apparent significant gap between targets and achievements to date can be attributed to several key factors. First, lack of strong technical leadership from WHO resulted in a leadership "vacuum" which other Roll Back Malaria partners attempted to fill, leading to competition and often conflicting advice. The Partnership's "loose" governance structure introduced inefficiencies in decision-making and the contributions of various partners were not effectively coordinated. Secondly, largely as a consequence, incorrect technical policies were adopted in countries, or correct ones were adopted too slowly to save lives. For example, although the importance of switching to treatment of malaria with ACTs was known, WHO did not emphasize that effort clearly or strongly enough, and until recently funding agencies continued to support the purchase of ineffective anti-malarial drugs. Indoor residual spraying was neglected as a major means of malaria vector control, and no clear policy recommendations were issued until late on the use of intermittent preventive treatment in pregnancy despite growing resistance of Plasmodium falciparum to sulfadoxine-pyrimethamine, the drug used for that intervention. Global debates continued unresolved as to the merits of free distribution versus social marketing of insecticide-treated nets, as precious time and lives were lost. Thirdly, while Roll Back Malaria partners agreed on targets, they were unable to reach consensus on clear strategies for how to achieve them. Fourthly, monitoring and evaluation was largely ineffective, leading to the inability to hold countries and partners accountable. In most countries, the coverage and impact of anti-malarial interventions have been monitored using mainly surveys which are costly and subject to a significant time lag.

9. Owing in part to such deficiencies, many of the funds that were pledged for malaria control have failed to become available or have been significantly delayed. The Global Fund to fight AIDS, Tuberculosis and Malaria started disbursements of grants for malaria control only in early 2003. Malaria funding from the World Bank from 2000 to 2005 was much lower than promised and commitments have only recently been stepped up. The creation of the United States President's Malaria Initiative in 2005 raises hopes that much greater resources will be available for malaria over the next half decade. In terms of domestic funding, only Botswana has yet to meet the target, established by African leaders, to devote 15 per cent of government budgets to health.

10. A rapid increase in demand, together with inadequate attention to supply chain management, led to global shortages of key commodities, most notably single-source ACTs or limited-source long-lasting insecticide-treated nets. That problem has been particularly acute in relation to artemether-lumefantrine, manufactured as a single-source product by Novartis Pharma AG. Orders for artemether-lumefantrine

have increased rapidly since 2001, when WHO requested 220,000 treatment courses for the public sector. In 2004, a demand of 10 million treatment courses was forecasted, but the manufacturing company has been able to deliver less than half of such orders owing to insufficient supply of the key ingredient, artemether, from its Chinese suppliers. The reason for the shortage was an insufficient supply of artemisinin, the raw material extracted from the plant *Artemisia annua*, which is needed to manufacture artemether. Cultivation of the plant requires a minimum of six months. The extraction, processing and manufacturing of the final product require an additional three to five months. The recent surge in demand for artemisinin has created temporary pressure on availability in the market. The global shortage of artemether-lumefantrine lasted until the end of 2005. Since the last quarter of 2005, the manufacturing company has invested in expanding manufacturing facilities, sourcing artemisinin raw materials and increasing production capacity to meet the global demand.

11. While, initially, most artemisinins were produced in very few countries, notably Viet Nam and China, global production capacity has now expanded to a number of other countries. Both the United Nations pre-qualification programme and the WHO/UNICEF procurement procedures, which enable selection and procurement of quality ACTs for which no pre-qualified product is yet available, have made it possible to procure such quality therapies in sufficient amounts to meet global demand. Both systems are open to both innovator products and quality products and have contributed to increase price competition among manufacturers and suppliers of quality ACTs. A substantial decrease in price over the years has been achieved through the WHO/UNICEF joint tender procedures, increased international funding for ACTs and coordinated efforts to consolidate country forecast and demand. The production capacity of such therapies for 2006 by the six major pharmaceutical companies is estimated at 130 million treatment courses and exceeds the public sector demand for ACTs, which was estimated at 110 million treatment courses at the beginning of 2006. Demand for long-lasting insecticide-treated nets suddenly increased from 20 per cent of all bednets ordered by countries in 2004 to more than 80 per cent in a year's time, creating a shortage in production capacity. However, production capacity rapidly increased and is currently just over 5 million per month, up from approximately 1.6 million per month in February 2005, and is expected to rise to approximately 7 million per month by June 2007 and significantly more in December 2007.

12. All of the foregoing factors have resulted in the lack of cohesive, coordinated support to malaria-endemic countries. During the past five years, the Roll Back Malaria Partnership has not been successful in implementing the most appropriate policies and strategies in countries and the impact on the ground has been negligible in comparison to the investment.

III. Malaria control: 2006 onwards

13. Recognizing those critical flaws, WHO decided to re-strategize its malaria programme by establishing the Global Malaria Programme at the beginning of 2006 so as to be able to respond cohesively and strongly to the needs of malaria-endemic member States. The Programme encompasses staff at headquarters and at the regional and country levels. The revised strategic direction has a number of key components: (a) providing strong WHO technical leadership on malaria control

policies and strategies and support to countries, (b) expanding the focus to malaria-endemic countries worldwide, in addition to the African continent, (c) supporting malaria-endemic countries to apply the best available tools, including indoor residual spraying where indicated, free or highly subsidized distribution of long-lasting insecticide-treated nets to all at-risk groups and diagnosis of malaria cases and treatment with ACTs, and working closely with countries to ensure that interventions are tailored to their particular epidemiologic and socio-economic profile; (d) ensuring that malaria control efforts contribute to strengthening health systems and support integrated delivery of essential health services; (e) fostering a multisectoral approach, with strong health-sector leadership, to gather political support for long-term investments in the health sector and to link national health priorities with development agendas; (f) providing greater focus and rigour to the development and implementation of effective monitoring and evaluation tools to measure programme performance, effective coverage and impact; (g) supporting priority research to develop new methods and tools and to address implementation bottlenecks; and (h) pursuing well-coordinated partnership at the country level to ensure that support is harmonized and aligned with national strategies and plans.

14. To be feasible and sustainable, malaria control must be placed in the context of strengthening health systems. That is a particular focus for WHO. Effective delivery of anti-malarial interventions is hampered by insufficient supplies of essential drugs and preventive measures, inadequate human resources and poor health infrastructure. Strategies to train increased numbers of people, such as medical entomologists, public health specialists and programme managers, in needed specialties as well as incentives to forestall "brain drain" owing to migration to other countries, are urgently needed. In addition, malaria-endemic countries need support to develop (a) managerial capacity to oversee health-care personnel at the national and district levels and (b) efficient mechanisms for quality laboratory services to ensure reliable diagnosis and effective case management. That effort needs to be complemented by a system for the procurement and distribution of medicines, reagents, insecticides and other essential commodities.

15. Since its inception in February 2006, the Global Malaria Programme has already begun to demonstrate the success of that revitalized strategic direction. As a first step, broad stakeholder consensus has been reached on the three main interventions — diagnosis of malaria cases and treatment with effective medicines, distribution of insecticide-treated nets to achieve full coverage of populations at risk of malaria, and indoor residual spraying as a major means of malaria vector control to reduce transmission and eliminate malaria — through mechanisms such as the Strategic Technical Advisory Group to the Director-General. Those interventions have been shown to be cost-effective even in a very low-income country.[1] Moreover, preservation of the life-saving efficacy of ACTs has been vigorously promoted through a global artemisinin monotherapy ban.

16. The Roll Back Malaria Partnership itself has also initiated a "change process" to make the secretariat and Board more responsive to needs. That has included revising the targets upwards to 80 per cent coverage and looking for ways to make the Partnership more effective. WHO is working within the Roll Back Malaria "change process" and contributing to the Partnership by delivering more robust strategic and technical leadership on curative and preventive interventions, ensuring

[1] Bremen and others, *Conquering Malaria* (2nd edition, April 2006), chap. 21.

that the most appropriate policies are implemented at the country level and increasing the capacity of countries to achieve the World Health Assembly and Millennium Declaration targets for malaria by 2015. At the country level, WHO is successfully working with partners such as UNICEF to scale up distribution of insecticide-treated nets and is starting to work with the World Bank to ensure adoption of appropriate drug policies and increased access to artemisinin combination therapy worldwide.

IV. Case management

17. Malaria-endemic countries continue to shift their treatment policies for Plasmodium falciparum malaria away from monotherapies, which have lost their effectiveness owing to parasite resistance. Artemisinin-based combination therapies are generally considered the best current treatment for uncomplicated falciparum malaria. To date, 67 countries — 41 of them in Africa — have adopted such therapies as recommended by WHO, as their first or second-line treatment. WHO continues to assist countries in their transition to ACTs use through collaboration in the review of results of therapeutic efficacy studies of first-line malaria treatment, national consensus meetings to update the malaria treatment policy, development of national treatment guidelines, training of health workers, procurement and implementation of the new artemisinin-based combination therapies policy. In 2005, approximately 32 million ACTs treatment courses were procured globally, with 25,539,044 in the Africa region.

18. Thus far, 39 countries, 21 in Africa, are deploying ACTs. In February 2006, WHO launched its Guidelines for the Treatment of Malaria. The aim of the treatment guidelines is to provide clear and straightforward recommendations for the treatment of malaria, based on sound evidence that can be applied effectively in most settings. WHO is developing operational manuals to support implementation of the therapies and is also helping communities monitor coverage and measure the impact of those new treatments through the development of indicators and reporting forms at the facility and community levels. WHO is also developing new information, education and communication materials to support ACTs implementation.

19. Parasite resistance to medicines continues to undermine malaria control efforts. WHO has also called for continuous monitoring of the efficacy of recently implemented ACTs, and countries are being assisted in strengthening their drug resistance surveillance systems. In order to preserve the efficacy of artemisinins, as an essential component of life-saving ACTs, WHO has called for a ban on the use of oral artemisinin monotherapies, at various levels, including manufacturers, international drug suppliers, national health authorities and international aid and funding agencies involved in the funding of essential antimalarial medicines. WHO is updating guidelines on pharmacovigilance to ensure the monitoring of the safety profile of newly introduced medicines. A global report on the state of anti-malarial drug resistance was launched in September 2005.

20. Efficiency and quality of care is greatly improved by strengthening diagnostic services at all levels of care. WHO is therefore providing technical assistance to countries to procure, deploy and monitor the quality of rapid diagnostic tests for malaria and to improve the quality of malaria microscopy. Training manuals and

tools for malaria microscopy and guidelines on quality assurance of both microscopy and rapid diagnostic tests are also being prepared and will be deployed by the end of 2006.

21. In Africa, 22 countries have adopted Home-based Management of Malaria to improve access to effective treatment by vulnerable populations (especially children below five years of age) in countries that have low health facility coverage. Rectally administered artemisinins are being increasingly used at the peripheral levels of the health system as a pre-referral treatment for severe malaria. That intervention has the potential of saving children's lives by rapidly reducing high parasite densities until the child reaches a health institution where parenteral treatment can be provided.

22. The quality of products (medicines and diagnostics) and services is critical for good clinical outcomes and yet poses enormous challenges in countries. Counterfeit antimalarial medicines are being increasingly found in the markets of Asian and African countries. WHO, the Wellcome Trust and Interpol are collaborating in an attempt to curb counterfeits of artesunate tablets which are being found in south-east Asia by investigating their sources and alerting national drug regulatory authorities to detect them. The price of artemisinin-based combination treatments is much higher than previous monotherapies (chloroquine and SP), which make them unaffordable to many poor people. UNITAID, the international drug purchase facility launched by Brazil, Chile, France, and Norway which will be financed by an international tax on air travel, is moving ahead and will begin its first effective ACTs funding actions by October 2006. The objective of UNITAID is to serve as a reliable and sustainable source of financing to ensure access to affordable drugs for HIV/AIDS, tuberculosis and malaria.

V. Malaria in pregnant women

23. WHO recommends intermittent preventive treatment in pregnancy (IPTp), in addition to reducing malaria transmission by vector control interventions, for the prevention of malaria in pregnancy in areas of stable, moderate to high transmission, together with effective case management of malaria illness and anaemia. IPTp is not recommended for the prevention of malaria in pregnant women in areas of low, unstable transmission in Africa, Asia and Latin America.

24. IPTp with sulfadoxine-pyrimethamine (IPTp-SP) has been adopted as policy in 33 of 35 (94 per cent) African countries with an appropriate malaria transmission pattern, of which 22 are at various stages of implementation. However, the current rapid increase in resistance of Plasmodium falciparum to SP and the lack of safety and efficacy data on alternative antimalarial drugs for prevention and treatment pose an enormous challenge to the successful control of malaria in pregnancy. WHO now recommends that countries with parasitological failure rates to SP in young children of more than 50 per cent should not start implementation of IPTp-SP, while those that are already implementing IPTp-SP should monitor programme effectiveness and markers of SP resistance. WHO is working with research partners to ensure that data on the safety and efficacy of alternatives to SP for both prevention and treatment are generated as a matter of urgency. Since the majority of African countries have now changed to ACTs for first or second-line treatment of malaria, there is an urgent need to obtain safety data on the inadvertent use of ACTs in the first trimester of

pregnancy. WHO is supporting the establishment of pregnancy registries to facilitate follow-up of women who were exposed to ACTs during this critical period.

25. Although the use of mosquito nets by pregnant women is generally low, recent efforts to deliver free or highly subsidized nets to pregnant women at the time of antenatal clinic attendance has increased coverage to over 50 per cent in Malawi, Kenya and the United Republic of Tanzania.

VI. Prevention of malaria

26. WHO is focusing on universal access to insecticide-treated nets (long-lasting insecticide-treated nets), in partnership with UNICEF. Both agencies continue to advocate for free or highly subsidized insecticide-treated net distributions on a regular basis or through campaigns to reach vulnerable populations. In particular, to help reduce child mortality in a sustainable way, the delivery of nets should be integrated with antenatal care, the expanded programme on immunization (routine and campaigns) and other child health activities to rapidly increase and sustain coverage. Throughout the 31 countries in the Africa region which reported in 2005, 18,166,488 free or highly subsidized insecticide-treated nets were distributed and 7,568,439 nets were retreated. At present, the only country which has almost achieved the Abuja target of 60 per cent coverage of children under 5 years of age with an insecticide-treated net is Eritrea. It is estimated that 685,000 nets were distributed throughout North Africa and the Middle East in 2005.

27. High coverage rates with a high degree of equity have been achieved in the following situations: free delivery to entire communities (Eritrea); free or highly subsidized delivery to pregnant women through antinatal care (Malawi, Kenya and the United Republic of Tanzania); free distribution to children under 5 years of age in combination with immunization campaigns (Zambia, Ghana, Togo and the Niger). On a more limited scale, high levels have also been achieved in combination with routine expanded programme on immunization and child health days, such as the UNICEF-supported Accelerated Child Survival and Development projects in West Africa. Unfortunately, in general, community-based projects have never been able to achieve high coverage levels in poor rural areas. While social marketing has sometimes been useful for creating demand, its cost-effectiveness has been questioned and it has not achieved high coverage among poor rural populations, especially when insecticide kits are needed to re-treat the nets.

28. The bottlenecks to scaling up insecticide-treated net coverage have been (a) the need for regular re-treatment, (b) availability, (c) affordability and (d) implementation. Long-lasting insecticide-treated nets have been developed by industry to solve the re-treatment issue. Sudden and high demand for such nets by countries supported by the Global Fund to Fight AIDS, Tuberculosis and Malaria and other funding agencies created a bottleneck for supply in 2005 and early 2006. That has been mostly resolved through a sharp increase in production capacity of the existing manufacturers as well as the entry of several new producers from December 2006 to June 2007. It is now less expensive to reach high-level coverage through the use of long-lasting insecticide-treated nets than through the use of conventionally treated insecticide-treated nets, as the price of a long-lasting insecticide-treated net is now on average $5 and it can protect two people for 3 to 5 years. Long-lasting insecticide-treated nets (or insecticide-treated nets for that

matter) are, in general, still not affordable for most of the rural population in Africa and must be delivered free or highly subsidized in order to scale up coverage, for when nets are within reach — both physically and financially — there is a high demand. To date, 64 per cent of countries in the African region have waived taxes on insecticide-treated nets. Countries must be assisted to scale up the necessary planning, organizational and managerial capacity to plan large-scale distribution campaigns. That must also include an information/education component, as some populations are still reticent to sleeping under an insecticide-treated net or do not use it consistently.

29. The other vector control intervention with wide applicability is indoor residual spraying, the application of insecticides to the inner surfaces of dwellings with the aim of reducing the life-span of mosquitoes to such an extent that they cannot transmit malaria. Indoor residual spraying has been used systematically and on a large scale mainly in those countries which were involved in the global malaria eradication campaign in the 1950s and 1960s, i.e. those in Asia, North Africa, the Horn of Africa, southern Africa and the Americas. The selection of an insecticide for indoor residual spraying in a given area is based on insecticide resistance status of vectors, feasibility, costs, safety, type of surface to spray and local experience. Of the 12 insecticides currently recommended by WHO for indoor residual spraying, DDT has the longest residual action. It is also the cheapest insecticide per square metre sprayed, but because of its weight and bulk, it may be more expensive than some of the alternatives when transport is costly.

30. Trends in the application of indoor residual spraying vary from region to region. In Africa, where 9 countries (of 17 which apply indoor residual spraying) have provided data regularly to WHO in recent years, the total number of households protected by such spraying in those countries (Eritrea, Mozambique, Namibia, Rwanda, South Africa, the Sudan, Swaziland, Uganda and Zambia) increased from 1,897,000 in 2000 to 2,755,000 in 2003, while in Asia, in 4 countries (Iraq, Myanmar, Thailand and Viet Nam) of 22 regular users, the number of households covered increased from 2,297,000 to 3,052,000 over the same period, and in the Americas, it decreased in 9 (of 21) countries that regularly apply indoor residual spraying (Costa Rica, Nicaragua, Panama, the Dominican Republic, Bolivia, Colombia, Ecuador, the Bolivarian Republic of Venezuela and Argentina), from 411,000 to 229,000. India remains the country where most people are protected by indoor residual spraying, with 42 million people protected in 2004, mainly with DDT.

31. In June 2006, the WHO Regional Office for Africa arranged a consultation on the use of DDT for indoor residual spraying in Brazzaville. Among the main outcomes were (a) an acknowledgement that indoor residual spraying should be deployed within the context of an integrated vector management strategy. The synergistic combination of locally appropriate interventions would maximize programme impact on local disease burden, and (b) a call on countries to (i) ensure careful decision-making and flexibility in the selection of interventions and the allocation of resources to the various options, with the long-term view on feasibility and sustainability of full coverage; (ii) build/strengthen relevant capacities to plan, implement, monitor and evaluate appropriate malaria vector control interventions, including indoor residual spraying with DDT; (iii) establish systems for prospective monitoring of potential adverse effects of insecticides, particularly DDT; (iv) document and disseminate lessons learned in the use of DDT; and (v) follow

expiring WHO guidelines and recommendations on the use of DDT for indoor residual spraying.

35. WHO is finalizing an updated comprehensive manual and new monitoring systems on indoor residual spraying and will in the coming year greatly intensify its work to assist countries to make the best use of that intervention.

VII. Surveillance monitoring and evaluation

36. The vastly increased resources and efforts to scale-up anti-malarial interventions in populations at risk — particularly through the World Bank Booster Program, the implementation of the Global Fund to Fight AIDS, Tuberculosis and Malaria proposals for malaria and the Malaria Initiative — all call for rigorous monitoring and evaluation at the country level. Assessing the progress of malaria control efforts has been very difficult, in part because countries generally have no baseline against which to measure. Routine health reporting systems are not sufficiently representative, as large sectors of the populace (mostly the lower quintiles) do not have access to health services and information is not yet collected systematically in many countries. Given the complexity of malaria as a disease and multiple malaria control interventions, many of which are delivered outside the public health system, monitoring and evaluation solutions need to be flexible enough to reach the community and household levels. In addition, current methods focus mainly on assessing effective coverage and impact of interventions, without sufficient attention to the performance of programmes. Household surveys, such as Demographic and Health Surveys and Multiple Indicator Cluster Surveys, are expensive, not timely and not suitable as a management tool by national programmes. All of those factors have led to ineffective programme assessments and failures to report effectively and in a timely manner on the progress made.

37. To address that situation, WHO is (a) making efforts to increase effective use of information gained through routine programme monitoring and evaluation to improve programmes and guide the allocation of programme resources and (b) providing the leadership and necessary guidelines, standardized tools and methodologies to develop specially designed, simple community and facility-based malaria surveys that can be done at lower cost and with less of a time delay than those that are available currently. Where possible, such special malaria surveys need to be coordinated with other surveys which are useful but insufficient to meet the monitoring and evaluation needs of malaria control. Initially, substantial financial resources will need to be invested in the design of those surveys, in the development of survey tools and subsequent piloting and implementation.

38. WHO is helping countries in the development and implementation of a country database with field-tested indicators. That database, which will include indicators on the epidemiological situation, malaria policy, strategies and programme performance, drug and insecticide resistance and resource flows, will bring together in a systematic way existing data and information related to malaria. WHO has committed itself to ensuring that that system is in place in all 107 malaria-endemic countries within the next two years.

VIII. Malaria epidemics and complex emergencies

36. The areas of the world whose populations are most affected by complex emergencies are often those with the greatest malaria burden. Consequently, malaria is a significant cause of death and illness in emergency situations. Over 30 per cent of global malaria mortality is estimated to occur in such countries. The circumstances of a complex emergency undermine any pre-existing malaria control measures and lead to the collapse of health services. Population movements and displacement, increased vulnerability owing to malnutrition and concurrent infections, poor or absent housing, environmental deterioration resulting in increased vector breeding, and poor knowledge among intervening health agencies all contribute to the increased malaria burden. As a result, people become more vulnerable to malaria attacks, severe malaria and death from malaria. Malaria control in emergencies requires specially adapted strategies. In December 2005, WHO published the inter-agency field handbook entitled "Malaria Control in Complex Emergencies". The handbook provides policymakers, planners, field programme managers and medical coordinators with up-to-date practical guidance on designing and implementing measures to reduce malaria morbidity and mortality, in particular during the acute phase of an emergency. WHO is continuing its practical field support to affected countries during acute crises, such as in the Somalia-affected areas and the Niger food crisis, and on an ongoing basis in the context of the Global Fund to Fight AIDS, Tuberculosis and Malaria proposal development and implementation in countries in crisis. The Malaria in Emergencies Network, facilitated by WHO, became operational in April 2005 with teleconferences three times a month and an e-mail list to serve for the immediate sharing of vital information with a wide group of emergency partners.

37. It is difficult for countries to allocate resources for epidemics, especially when there are insufficient resources for the day-to-day health-care needs of malaria-affected populations. WHO has supported efforts to improve preparedness, early recognition and effective and timely response mechanisms, including deployment of malaria early warning systems. However, the best preparation for epidemics is to strengthen health information systems to report weekly on the disease in high-risk areas and seasons, and serve as sentinel sites for early detection. An estimated 144 million people in Africa currently live in areas at risk of epidemic malaria.

IX. Malaria elimination

38. Over the last decade, several malaria-endemic countries have so seriously pursued malaria control that elimination targets are being reached and local malaria transmission is being interrupted nationwide. In 2003, the United Arab Emirates was the first country since the 1950s to officially request WHO to certify their malaria-free status. A WHO assessment for possible certification took place in March 2006. Similar requests from another 10 to 15 countries may be expected up until 2015, as certification of malaria elimination can affect a country's international political and socio-economic image, and its attractiveness for international investment and tourism. In light of these developments, WHO has decided to put a renewed focus on malaria elimination, including the development of guidelines for national malaria elimination programmes, provision of technical and operational support to countries

in the near-elimination phase and the establishment of mechanisms for official certification.

39. Already, the WHO European and eastern Mediterranean regions have adopted malaria elimination as part of their regional strategies, as a logical extension of the malaria control successes achieved by their member States. In the WHO European region, the 2005 regional declaration to move from malaria control to elimination was agreed to by all malaria-affected countries of the region. The WHO eastern Mediterranean region is supporting malaria elimination in countries where interruption of transmission is feasible and potentially sustainable, namely, Egypt, Morocco, Oman and Syria.

V. Research and development

40. In order to ensure the success of malaria control efforts over the long term, increased investments in malaria research and development, commensurate with the scale of the disease, are needed. In October 2005, the Bill and Melinda Gates Foundation awarded $258.3 million in grants for malaria research. The grants will bring worldwide malaria research spending to about $325 million per year. However, malaria research and development is still very under-funded relative to the burden of the disease. In 2004, the total investment in malaria research and development amounted to about $323 million, or approximately 0.3 per cent of total health-related research and development investment. Yet, malaria's impact on humanity is roughly 10 times that amount, accounting for 3.1 per cent of the global disease burden. The continual development of new anti-malarials will cost at least $30 million per year, possibly more after 2006, when more projects move into the expensive phase of clinical development.

41. New medicinal products are in the malaria research and development pipeline. Three new formulations of existing ACTs — two developed jointly by the Drugs for Neglected Diseases Initiative with pharmaceutical companies (expected to be registered in 2006 and 2007 as fixed-dose combinations) and one developed by Novartis and the Medicines for Malaria Venture (MMV) (expected to be registered in early 2007 as a paediatric formulation). Three new ACTs are in the development portfolio of MMV in late stages of development and the registration of those new medicines will start in 2007. Research carried out by the Special Programme for Research and Training in Tropical Diseases is providing important insights into improving delivery of treatment at the community level and is helping to formulate policies for the use of rapid diagnostic tests in high-transmission areas. Data on the safety, efficacy and cost-effectiveness of intermittent preventive treatment in infants, the administration of anti-malarial drugs to asymptomatic infants at the time of routine vaccination during the first year of life, which has potential as a new malaria control strategy, will be reviewed by WHO later this year. Research on malaria vaccines advanced further during the course of this year, and the RTS,S vaccine, which is in the most advanced stages of clinical testing, is currently undergoing phase III clinical trials.

42. WHO and its partners have been collaborating closely to stimulate development of long-lasting treatment technologies for mosquito nets and its transfer for local production of long-lasting insecticide-treated nets in Africa. Development of more effective or user-friendly vector control tools, including

insecticide(s) alternative to DDT and pyrethroids, have recently received growing interest, especially through a major initiative of the Bill and Melinda Gates Foundation. Also strengthened has been the monitoring of vector insecticide resistance by member States in the framework of WHO regional networks and the search for practical policies to address resistance issues.

43. Knowledge gaps and tools which are critical for malaria control today have to be addressed by the global research agenda. WHO will define the priorities for research for malaria control through a critical analysis of the evidence gaps and implementation challenges to ensure a highly relevant global portfolio of malaria research which will include defining the product profile, product development, operational and implementation research, and evidence for policies and strategies. As the scale-up of anti-malarial interventions in countries is gathering momentum, new bottlenecks and problems are being encountered. To ensure that those issues are rapidly and effectively addressed, WHO has expanded its realm of activities to include research and development, both identifying and defining the priority research agenda for malaria control, as well as coordinating and/or commissioning the necessary research. Seeking evidence on cost-effectiveness of current and new interventions for malaria will take priority in order to inform country-level decisions on which interventions to adopt and on the choice of the most optimal combination among multiple interventions.

XI. Funding and resource mobilization

44. WHO estimates that averting 100,000 child deaths from malaria per year would require approximately $100 million in resource costs to society. The global resources needed to control malaria effectively are estimated at approximately $3.4 billion per year (on average, $1.8 billion per year for Africa and $1.6 billion per year for other malaria-endemic regions of the world). Those estimates include the need for ACTs, which are more expensive than other anti-malaria drugs but required in countries with drug-resistant falciparum malaria; technical assistance; and related health-system development. Use of the informal private sector for malaria treatment, combined with weak health information systems, presents a challenge for accurate estimation of malaria spending.

45. At the country level, reliable information on the burden of the disease and the financing for malaria prevention and control is lacking, rendering difficult informed policymaking and effective resource allocation. In 2000, African Heads of State and Government pledged to reduce or waive taxes and tariffs for key malaria control commodities, such as anti-malarial drugs, bed nets and insecticides, but to date, only approximately 50 per cent of African countries have done so. In 2001, African leaders pledged to set a target to allocate 15 per cent of annual government budgets to the health sector. Despite modest progress being made by some member States, the proportion of the government budget devoted to health is still low in many countries (to date, only Botswana has allocated 15 per cent of its national budget to health).

46. International funding for malaria increased significantly over the period 1999-2004, with a dramatic rise in 2001, following the creation of the Global Fund to Fight AIDS, Tuberculosis and Malaria. A 2005 survey of development agencies found a total of approximately $600 million available for malaria (but not disbursed)

in 2004 and noted that since 2001, sub-Saharan Africa has received more than 75 per cent of funds. The Global Fund reports that its total international disbursements for malaria in 2005 were approximately $308 million, bringing the total disbursed to date by the by the end of July 2006 to approximately $748 million. The Fund is active in 73 countries, financing a total of 99 malaria grants, all of which have had WHO input at all, or some, stage of the preparation and implementation process.

47. In addition, recent pledges from major donors have raised expectations that additional funds will be available for malaria. Total United States funding for malaria doubled from 2002 to 2005, from $118 million to $246 million. The Malaria Initiative has announced an increase in funding of malaria prevention and treatment by more than $1.2 billion over five years. In June 2006, four more countries (Malawi, Mozambique, Rwanda and Senegal) were added to the Malaria Initiative as focus countries. At the 2005 Group of 8 summit, the leaders committed to scale-up action against malaria to reach 85 per cent of the vulnerable populations with key interventions and to contribute the additional $1.5 billion a year needed annually. To date, the best estimates still only show that half that goal has been reached.

48. In April 2005, the Global Strategy and Booster Program for Malaria Control was launched as the World Bank's plan for controlling the disease during the period 2005-2010. In September 2005, the Booster Program for Malaria Control in Africa, which is a plan for Bank support for malaria control efforts in Africa, was presented. Eight projects were approved by the World Bank in the last year, bringing total commitments for malaria control in Africa to $167 million. Projects are under preparation in seven additional countries, with approximately $260 million in the pipeline to support them. The World Bank is emphasizing donor harmonization in malaria control and is working to mobilize additional resources from partners. In this fiscal year, the Booster Program expects to fund $190 million in malaria control projects.

49. The special summit of African Union Heads of State and Government on HIV and AIDS, Tuberculosis and Malaria, held in Abuja from 2 to 4 May 2006, revisited its objectives set in 2000 and called for accelerated action towards universal access to HIV and AIDS, tuberculosis and malaria services in Africa. The Heads of State resolved to intensify the fight against the three diseases, in particular to ensure that malaria prevention and control is accelerated with the goal of eliminating malaria using all effective strategies, such as indoor residual sprayings, insecticide-treated nets, ACTs and IPTp.

50. Despite those positive signs, resources available for malaria control still fall dramatically short of what is needed to combat the disease effectively. In addition, while malaria-specific funding has been increasing, it is also increasingly focusing on funding of commodities without concurrent increases in funding for technical assistance to build country capacity. The lack of funding and lack of capacity act on each other in a vicious circle: without capacity, countries cannot absorb the available funding and without funding, they cannot develop capacity. Various initiatives are therefore hindered by implementation challenges and are not achieving their expected impact, leaving malaria morbidity and mortality levels unacceptably high.

XII. Conclusions and recommendations

51. Effective coverage of interventions for malaria control is currently inadequate, owing mainly to funding shortages, lack of technical expertise and weak health systems. Inadequate planning and the use of substandard or ineffective products are aggravating the situation. Increased funding for national malaria control programmes needs to be complemented by funds for technical assistance, for without parallel increases in absorption capacity — through well-trained human resources, strong infrastructure and technical support, championing the most locally appropriate strategies and policies — malaria funding does not reach target populations or goals. Funding also needs to be predictable so that national malaria control programmes can plan long-term investments, such as procurement and human resources. The role of the private sector in health-care delivery must also be defined better and its collaboration with the public sector enhanced to ensure quality of care, access to health services, and financial protection. Leadership of malaria control efforts in countries must be undertaken by the Ministry of Health, linking horizontal and vertical approaches in a comprehensive health-sector strategy. While there has been some progress since 2000, there is still a critical shortage of complete and timely malaria data, without which it is impossible to monitor performance or measure impact.

52. On the basis of the findings of the present report and those of World Health Assembly resolution 58.2, it is recommended that the General Assembly call upon malaria-endemic countries to:

(a) Use, with support from WHO, the country database to systematically collect and analyse existing information on their malaria situation, including epidemiology, national policies and programme performance, coverage of interventions, financing and drug and insecticide resistance status;

(b) Apply WHO-recommended policies, strategies and tools to their specific contexts, and establish evidence-based national policies, operational plans and performance-based monitoring and evaluation towards scaling-up effective coverage of major preventive and curative interventions to populations at risk and assessing programme performance, intervention coverage and impact effectively and in a timely manner;

(c) Assess the capacity of their national malaria programmes, in particular their human resources, and ensure that skilled personnel are in place in adequate numbers at all levels of the health system to meet technical and operational needs as increased funding for malaria control programmes becomes available;

(d) Respond to the need for strengthening their health systems and ensure integrated delivery of health services at the district level, including attention to health personnel, supplies of drugs and preventive measures, and adequate health infrastructure;

(e) Encourage intersectoral collaboration, in particular at the highest levels of Government, i.e. the Ministries of Finance, Education, Agriculture, Economic Development and the Environment, and maintain and strengthen existing inter-country, multi-institutional and multisectoral malaria networks;

(f) Prohibit the marketing of oral artemisinin monotherapies and call upon funding agencies to do their part by ceasing to provide funding for procurement of oral artemisinin monotherapies or other medicines, including pre-qualified antiretroviral medicines, from manufacturers who continue marketing artemisinin monotherapy products;

(g) Waive taxes and tariffs for nets, drugs and other products needed for malaria control, both to reduce the price of those commodities to consumers and to stimulate free trade in those products;

(h) Strengthen, with support from WHO, drug resistance surveillance systems and call upon WHO to coordinate a global surveillance network for the monitoring and management of drug resistance;

(i) Undertake, with support from WHO, development of insecticide resistance surveillance systems and call upon WHO to coordinate a global network for the monitoring and management of insecticide resistance.

13. On the basis of the findings of the present report and those of World Health Assembly resolution 58/2, it is recommended that the General Assembly call upon:

(a) International partners to use monitoring and evaluation systems to be developed by WHO as minimum core indicators rather than adopting parallel systems and call upon WHO, together with countries and other partners, to develop simple, less costly survey methodologies to effectively assess impact and coverage of anti-malarial interventions in a timely manner;

(b) Bilateral and multilateral funding partners to become fully knowledgeable about WHO technical policies and strategies, including for indoor residual spraying, insecticide-treated nets and case management, to ensure that funding supports only projects that are in accord with those, and to consider submitting technical components of projects under consideration to be reviewed by WHO prior to approval to ensure adherence to the latest WHO technical recommendations;

(c) All donor agencies and food-importing countries to issue a clear statement outlining their position on the use of DDT for indoor residual spraying, when it is implemented where indicated and in accordance with WHO guidelines, and to provide all possible support to malaria-endemic countries to manage the intervention effectively and prevent the contamination of agricultural products with DDT and other insecticides used for indoor residual spraying;

(d) Producers of long-lasting insecticide-treated nets to accelerate technology transfer to developing countries and call upon the World Bank and regional development funds to consider supporting malaria-endemic countries to establish factories to scale-up production of long-lasting insecticide-treated nets;

(e) The international community to fight the counterfeit drug trade in developing countries and to reach a consensus on appropriate levels and sources of subsidies for key commodities, namely long-lasting insecticide-treated nets and ACTs, to enable expanded access to good quality drugs and preventive measures for populations at risk of malaria;

(f) WHO to review the global malaria research agenda from a malaria control perspective, involving the scientific community (which would include the major stakeholders, such as the Bill and Melinda Gates Foundation, the National Institute of Health and the European Union) and the national malaria programmes. The review would focus on new medicines to prevent and treat malaria, diagnostic tests, new insecticides and formulations, vaccines, operational and implementation research and new methodologies and tools for impact assessment and cost-effectiveness evaluation of anti-malarial interventions alone and in combination, in different settings, towards fine-tuning national malaria control strategies;

(g) The international community, inter alia, to financially enhance the Global Fund to Fight AIDS, Tuberculosis and Malaria to enable it to continue supporting countries and to provide adequate complementary resources for technical assistance, in particular for WHO and UNICEF, to ensure that funds can be absorbed and used effectively in countries.